

IN THE CLAIMS

1. (Original) An apparatus comprising:
two heat exchange members configured to be placed on both sides of a semiconductor module, the semiconductor module including a plurality of packages;
a connection member between the two heat exchange members configured to movably join the two heat exchange members, wherein portions of the two heat exchange members are configured to protrude above the semiconductor module; and
a biasing member disposed between the two heat exchange members and configured to provide a force that holds the two heat exchange members against the packages of the semiconductor module.
2. (Original) The apparatus of claim 1, wherein the connection member comprises a hinge.
3. (Original) The apparatus of claim 1, wherein the portions of the two heat exchange members have uneven surfaces.
4. (Original) The apparatus of claim 1, wherein the portions of the two heat exchange members comprise:
a metal plate having a porous surface.
5. (Original) The apparatus of claim 4, wherein the metal plate comprises an aluminum plate.
6. (Original) The apparatus of claim 1, wherein the biasing member is disposed between the portions of the two heat exchange members that protrude above the semiconductor module and is chosen from the group consisting of a spring, a plate spring, and a C-shaped spring.

7. (Original) The apparatus of claim 1, further comprising:
a thermal interface material layer formed on at least one of the heat exchange members and configured to contact a surface of the packages.
8. (Original) The apparatus of claim 7, wherein the thermal interface material layer is selected from the group consisting of a thermal tape, a thermal grease, a thermal epoxy, and a phase change material.
9. (Original) The apparatus of claim 7, wherein at least one of the two heat exchange members comprise a recess filled with the thermal interface material layer.
10. (Original) The apparatus of claim 7, wherein at least one of the two heat exchange members comprise a packing member bounding the thermal interface material layer.
11. (Cancelled)
12. (Original) An apparatus comprising:
a first heat exchange member including a first contacting portion, the first contacting portion configured to contact a surface of a semiconductor module to absorb heat generated by the semiconductor module, and a first heat dissipating portion, which is thermally connected to the first contacting portion to dissipate the heat absorbed by the first contacting portion;
a second heat exchange member including a second contacting portion, the second contacting portion configured to contact another surface of the semiconductor module to absorb the heat generated by the semiconductor module, and a second heat dissipating portion, which is thermally connected to the second contacting portion to dissipate the heat absorbed by the second contacting portion; and
an elastic member structured to provide a force that draws the first and second contacting portions toward each other.
13. (Withdrawn) The apparatus of claim 12, wherein the elastic member is a C-shaped spring having ends going through the first and second heat dissipating portions, the

apparatus and that are connected to external surfaces of the first and second contacting portions and which is oriented such that the connection portion is included in the space formed by the C-shaped spring.

14. (Previously presented) The apparatus of claim 12, further comprising:

a connection member, which joins the first and second heat exchange members such that the first and second heat dissipating portions protrude above the semiconductor module inserted between the heat exchange members, wherein the elastic member is chosen from the group consisting of a spring, a plate spring, and a C-shaped spring, and wherein the elastic member is disposed between the first and second heat dissipating portions.

15. (Cancelled)

16. (Previously presented) An apparatus comprising:

a first heat exchange member including a first contacting portion configured to contact a surface of a semiconductor module to absorb heat generated by the semiconductor module, and including a first heat dissipating portion with uneven surfaces, the first heat dissipating portion thermally connected to the first contacting portion to dissipate the heat absorbed by the first contacting portion, wherein the first heat dissipating portion is configured to protrude above the semiconductor module;

a second heat exchange member including a second contacting portion configured to contact another surface of the semiconductor module to absorb the heat generated by the semiconductor module, and including a second heat dissipating portion with an uneven surface, the second heat dissipating portion thermally connected to the second contacting portion to dissipate the heat absorbed by the second contacting portion, the second heat dissipating portion configured to protrude above the semiconductor module;

a hinge that joins the first and second heat exchange members; and

a biasing member disposed between the first and second heat exchange members to provide a force that draws the first and second contacting portions toward the surface and the another surface of the semiconductor module that is inserted between the first and the second contacting portions.

17. (Original) The apparatus of claim 16, wherein the first and second heat dissipating portions are made of an aluminum plate with porous surfaces.

18. (Original) An apparatus comprising:

a first heat exchange member including a first contacting portion that is configured to contact a surface of a semiconductor module to absorb heat generated by the semiconductor module, and including a first heat dissipating portion that is thermally connected to the first contacting portion to dissipate the heat absorbed by the first contacting portion, wherein the first heat dissipating portion is configured to protrude above the semiconductor module;

a second heat exchange member including a second contacting portion that is configured to contact another surface of the semiconductor module to absorb the heat generated by the semiconductor module, and including a second heat dissipating portion that is thermally connected to the second contacting portion to dissipate the heat absorbed by the second contacting portion, wherein the second heat dissipating portion is configured to protrude above the semiconductor module;

a hinge that joins the first and second heat exchange units;

an elastic member disposed between the first and second heat exchange members to provide a force that draws the first and second contacting portions toward the surface and another surface of the semiconductor module inserted between the first and second contacting portions;

thermal interface material layers formed on the first and the second contacting portions;
and

packing members bounding the thermal interface material layers.

19. (Original) The apparatus of claim 18, wherein the packing members comprise rubber packing members.

20. (Original) The apparatus of claim 18, wherein the first and second contacting portions comprise a recess filled with the corresponding thermal interface material layer.

21. (Original) The apparatus of claim 20, wherein each of the packing members is disposed around the corresponding recess.

22. – 32. (Canceled).

33. (New) A clothespin-type heat-dissipating apparatus comprising:
a first heat exchange member including a first contact portion, the first contact portion configured to contact one or more heat generating components attached to a first side of a circuit board;

a second heat exchange member including a second contact portion, the second contact portion configured to contact one or more heat generating components attached to a second side of a circuit board;

a hinge connecting the first and second heat exchange member, the hinge configured to allow the second heat exchange member to pivot with respect to the first heat exchange member; and

a biasing element disposed between the first and second heat exchange members, the biasing element configured to draw the first contact portion and second contact portion toward one another.

34. (New) The apparatus of claim 33, wherein the hinge comprises:

a first hinge portion attached to the first heat exchange member;

a second hinge portion attached to the second heat exchange member; and

a pin configured to pass through the first and second hinge portions.

35. (New) The apparatus of claim 33, wherein the first heat exchange member further includes a first heat dissipating portion and wherein the second heat exchange member further includes a second heat dissipating portion.

36. (New) The apparatus of claim 35, wherein the first and second contact portions of the first and second heat exchange members are disposed on a first side of the hinge and

wherein the first and second heat dissipating portions of the first and second heat exchange members are disposed on a second side of the hinge opposite the first side of the hinge.

37. (New) The apparatus of claim 33, wherein the first and second heat exchange members respectively include a thermal interface material formed on surfaces configured to contact the heat generating components of the circuit board.